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ORIGINAL ARTICLE

Comparison of transurethral plasmakinetic and transvesical prostatectomy in treatment of 100–149 mL benign prostatic hyperplasia

Zhi Long, Yi-Chuan Zhang, Le-Ye He*, Kuang-Biao Zhong, Yu-Xin Tang, Kai Huang

Department of Urology, The Third Xiangya Hospital, Central South University, Changsha, Hunan 410013, China

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Summary *Objective:* To compare the safety and efficacy of transurethral plasmakinetic resection of the prostate (PKRP) versus transvesical prostatectomy (TVP) in the treatment of large-volume benign prostatic hyperplasia (LV-BPH) (100–149 mL).
Methods: Ninety-nine BPH patients who had a prostate volume of 100–149 mL were divided into two groups to undergo PKRP or TVP. Preoperative clinical data were analyzed. Patients had follow-up appointments at 1 month, 3 months, 6 months, and 12 months postoperatively. Outcome measures included the International Prostate Symptom Score, quality of life score, maximum urinary flow rate, and postvoid residual urine volume. Adverse effects were also recorded.
Results: A total of 96 patients completed the 12-month follow-up. The operative time was longer, but intraoperative blood loss was lower in the PKRP group. Despite a higher percentage of patients requiring a blood transfusion, there was an obvious advantage in gland removal rate in the TVP group. The duration of postoperative catheterization, bladder irrigation, and hospital stay was significantly shorter in the PKRP group. Outcome measures were significantly improved in both groups 1 month postoperatively. The improvement in lower urinary tract symptoms was maintained throughout the 12 months after surgery. There were no significant differences in International Prostate Symptom Score, quality of life, maximum urinary flow rate, and postvoid residual urine volume between the two groups.

Conflicts of interest: The authors declare that they have no financial or non-financial conflicts of interest related to the subject matter or materials discussed in the manuscript.

* Corresponding author. Department of Urology, The Third Xiangya Hospital, Central South University, No.138, Tongzipo Road, Changsha, Hunan 410013, China.
E-mail address: leyehe@csu.edu.cn (L.-Y. He).

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Conclusion: PKRP has the advantage over TVP of being minimally invasive in the treatment of LV-BPH while achieving the same postoperative outcomes.

1. Introduction

Prostate volume is an important factor that affects the treatment of benign prostatic hyperplasia (BPH).[1] Surgical treatment of large-volume BPH (LV-BPH) poses a challenge to urologists. Although transurethral resection of the prostate (TURP) is considered the "gold standard" for surgical treatment of BPH,[2] the relatively long operative time, low efficiency of resection, and high incidence of postoperative complications (e.g., intraoperative and postoperative bleeding, postoperative hyponatremia, and urethral stricture) have limited its application in the treatment of LV-BPH.[3] Open surgery is the main treatment option for LV-BPH because of its shorter operative time, complete gland removal, and significant postoperative improvement in lower urinary tract symptoms.[4–6] However, given the advances in minimally invasive techniques, the use of traumatic open surgery for the treatment of LV-BPH is being increasingly disputed.[7–9] Transurethral plasmakinetic resection of the prostate (PKRP) is a relatively new minimally invasive procedure that has been used for the treatment of LV-BPH.[10] Having the advantages of accurate incision, good hemostasis, and "capsule recognition" function, PKRP can effectively prevent capsular perforation.[11] Moreover, PKRP can avoid the occurrence of transurethral resection syndrome (TURS) because normal saline is used as the irrigation solution.[12] Thus, PKRP is expected to replace TURP as the new "gold standard" treatment for BPH. However, there have been no previous studies evaluating the safety and efficacy of PKRP in the treatment of LV-BPH.

In the present study, we conducted a prospective randomized clinical trial to compare the safety and efficacy of PKRP versus transvesical prostatectomy (TVP) in the treatment of LV-BPH. Although many consider a large prostate volume as >80 mL or >100 mL, there remains a great deal of controversy about the definition of LV-BPH. The prostate volume in some BPH patients can be >500 mL.[13–17] In this study, we attempted to define large and huge prostate volumes as 100–149 mL and >150 mL, respectively. For the purpose of this study, all BPH patients with prostate volume ranging from 100 mL to 149 mL were considered to have LV-BPH.

2. Patients and methods

2.1. Patients

A total of 99 patients with LV-BPH (100–149 mL), who were treated from January 2005 to October 2010 at the Third Xiangya Hospital of Central South University, were included in this prospective trial. Preoperative clinical data for all the patients were analyzed, including age, medical history, International Prostate Symptom Score (IPSS), quality of life (QoL), digital rectal examination (DRE), prostate-specific antigen (PSA), maximum urinary flow rate (Qmax), prostate volume, postvoid residual urine volume (PVR), hemoglobin (Hb) concentration, and serum sodium (Na^+) concentration. Transrectal ultrasound (TRUS) was used to measure the maximum length (L), width (W), and anteroposterior height (H) of the prostate to calculate the prostate volume using the prostate ellipse formula: prostate volume (mL) = $0.52 \times L \times W \times H$.[18] Patients underwent an ultrasound-guided transrectal prostate biopsy if the PSA level was >4 ng/mL, the DRE was abnormal, or suspicious lesions were suggested by TRUS. Patients were given a thorough explanation about the advantages and possible risks of both modes of treatment. Written informed consent was obtained preoperatively from each patient. The included patients were divided into two groups by a urologist who was not involved in the surgery to undergo PKRP ($n = 50$) or TVP ($n = 49$). The study was approved by the local ethics committee.

The inclusion criteria were as follows: patients >60 years of age; able to tolerate surgery and anesthesia; not taking anticoagulant drugs or discontinuing anticoagulant drugs for ≥2 weeks; refusing to receive medical treatment or having failed in conservative medical treatment; QoL severely affected by lower urinary tract symptoms; one or more complications, such as recurrent urinary retention, gross hematuria, recurrent urinary tract infections, bladder stones, and secondary liquid accumulation in the upper urinary tract as a result of BPH; able to understand and sign informed consent; and able to complete follow-up as required. Exclusion criteria were neurogenic bladder; previous bladder, prostate or urinary tract surgery; urethral stricture; and known bladder or prostate cancer.

2.2. Surgical procedures

An experienced surgeon performed all surgeries. PKRP was performed using a bipolar plasmakinetic cutting wire loop (Gyrus Medical, Cardiff, UK) at a power setting of 160 W for cutting and 80 W for coagulation. A 0.9% sodium chloride solution was used to irrigate the area continuously. The 27F sheath was inserted to observe the changes in the urethral and bladder mucosa. According to the modified Nesbit procedure, an incision was made at the 6 o'clock position of the bladder neck to the proximal verumontanum to create a longitudinal marking groove that was extended to the verumontanum and carried down to the surgical capsule, with complete removal of the prostatic stroma. Then, another marking groove was made via an incision from the 11 o'clock to 1 o'clock position using the same method. Finally, the left and right lateral lobes of the prostate were